View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Research Papers in Economics

Munich Personal RePEc Archive

Distributional Aspect of Forest Income: A Study on JFM and non-JFM Forest Dependent Households

Das, Nimai and Sarker, Debnarayan
Centre for Studies in Social Sciences, Calcutta (CSSSC), R-1 Baishnabghata Patuli Township, Kolkata – 700094 (INDIA), Centre for Economic Studies, Department of Economics, Presidency College, 86/1 College Street, Kolkata – 700073 (INDIA)

2008

Online at http://mpra.ub.uni-muenchen.de/15330/
MPRA Paper No. 15330, posted 20. May 2009 / 13:19

Distributional Aspect of Forest Income:
A Study on JFM and non-JFM Forest Dependent Households

NIMAI DAS AND DEBNARAYAN SARKER

This study suggests that there is a narrower scope to expand inequality with the increase in forest sources of income to total income relative to non-forest income irrespective of the type of villages and types of FPCs. The addition of forest income in the JFM households after JFM reduces measured income inequality by about twelve percent, all else equal. But no such perceptible decrease has been found after JFM situation for non-JFM households. Categorically, forest income plays the dominant role in reducing measured income inequality for poor households who are relatively asset poor and that also live below poverty line. But this study also lends credence to the fact that the non-involvement in the JFM programme by the non-JFM households might bring about a major environmental shirking, because illegal timber income constitutes the major part of all sources of income for non-JFM households even after JFM situation.

Keywords: *Joint forest management (JFM) programme, JFM and non-JFM forests, forest dependent household, inequality of income, forest income.*

JEL Classification: *Q23, I32, D63, H41, D78.*

I. Introduction

That forest offers vast potential for poverty alleviation and reduction of income inequality among forest dependent poor has appeared a new focus in recent studies (Fisher, 2004; Pattanayak et al., 2004; Angelsen and Winder, 2003; Kumar, 2002; Kumar et al., 2000; Arnold, 2001; World Bank, 2001; Wunder, 2001; Cavendish, 1999; Scherr et al., 2002; Somanathan, 1991). With the increasing presence of forest products in the market

economy, greater importance for livelihood sustenance of forest fringe communities on forest resource and a greater understanding of the non-tangible benefits from forests, the concept of community forest management, like joint forest management (JFM), has naturally brought to the fore various interrelated issues concerning forest management, and the past working of the forests, allegedly only for timber extraction and industrial supplies, has come in for criticism. For nearly four decades or so environmentalists, conservationists, foresters, researchers, planners, policy makers and social scientists have been engaged in an intense debate on appropriate policy strategies (to reach at some consensus) as to how a sustainable livelihood from forest and non-timber forest products in particular could be ensured to forest dependent communities. In keeping with these policy strategies, there has been a shift over from revenue oriented forest management to conservation and that is related to participatory community based approaches in most of the developing countries during the last one and a half decade (Bhattacharya, 2001:107). There is rich empirical evidence to support the claim that forest is an important source of income for the poor forest fringe households through the extraction of wood (timber and firewood) and non-timber forest products (NTFPs) or non-wood forest products (NWFPs) by preserving the forest resource sustainable with the help of cooperative management (Somanathan, 1991; Pattanayak et al., 2004; Guha, 1989; Jodha, 1986, 1992; Kumar et al., 2000; World Bank, 2001). Access to forest for fuelwood is substantially important to local people and makes substantial contribution to households' welfare (Pattanayak et al., 2004:176). Asset-poor in Malawi in southern Africa, for example, are observed more reliant on both low return forest activities (LRFA) – e.g. fuel wood and non-timber forest products – and high return forest activities (HRFA) – e.g. timber – compared with the better off and access to forest income in rural Malawi help the poor not only to prevent by supplementing income, but also to improve their living standard over time (Fisher, 2004: 147- 151). This study seeks to examine the incidence of forest income and the lowering of income inequality of forest dependent households based on a comparative study between JFM and non-JFM households in a specific context of West Bengal in India. This study seems to be important in that it tries to examine whether JFM programme in India, which recognizes the need to fulfill the requirements of fuel wood, fodder, minor forest produce and small timber to facilitate improvements in the socio-

economic condition of the rural poor and tribal communities, and emphasizes the need to create a massive people's movements for protection and development of forests (MoEF, 1988), could reduce more inequality of income for JFM households in relation to non-JFM households.

The next section presents the relevance of this study in the context of West Bengal. Section III discusses the basic empirical strategy. The data set appears in section IV. Section V presents the main results. Section VI concludes.

II. Relevance of the Study

Why is the study relevant in West Bengal? *First*, West Bengal has a historical relevance for tribal and peasant resistance movements against old custodian forest management system. As is well known, in the context of Indian forestry, several strands have contributed to the present emphasis on community involvement in forest protection. JFM emerges as the latest in a long history of policy changes, attempting to create a new relationship between 'state' and 'community' (Sarker and Das, 2006a:269). The old custodian forest management systems were rendered ineffective in the 1950s and 1960s due to various reasons, mainly traditional emphasis on production of commercial wood and disregard for local needs (Sarmah and Rai, 2001:213; Poffenberger, 1995:342-50). Against the old custodian forest management system, the local forest fringe communities in different parts of India have mobilized repeatedly and since long to protect 'their' local resources from manipulation by outside groups. The emergence of new community forest management system in south West Bengal including our study area is also grounded historically in tribal and peasant resistance movements. Against the custodian forest management system, the local forest fringe communities – *Santal*, *Bhumij* and *Mahato* tribals, and some low cast Hindus – in south West Bengal mobilized repeatedly against *Mughal* and *British* rulers to protect their traditional rights on forestland from long past. *Chur Rebellion* (1767-1805), *Naik Revolt* (1806-1816) and *Hul Rebellion* (1855) are the glaring examples of the history in south West Bengal (Poffenberger, 1995:342-49). During Chur Rebellion, the tribal communities of this area mobilized resistance through a series of armed revolts against the British empowered new class of *zamindars* who took attempts to clear forest land and convert it into agricultural land to increase their revenue.

"Tribal guerrillas were so effective that even as late as 1800, after nearly forty years of British occupation, a collector reported that two thirds of Midnapore consisted of jungle, the greater part of which was inaccessible" (Sarker and Das, 2006a:271). Yet, gradually the British Company succeeded in strengthening its control, despite subsequent revolts by forest fringe people, such as the Naik Revolt. The pressure on the forest grew further by the 1860s as the growing railway system demanded immense quantities of sal logs to provide sleepers for rail bed. Commercial demand for timber accelerated forest cutting, and raised the value of forestlands. Timber merchants rushed in, even before the rail lines opened and began leasing or purchasing large tracts from the Midnapore Zamindary Company and other zamindars. In early 1855, six to seven thousand Santal tribal from, Birbhum, Bankura, Chotonagpur and Hazribagh began meeting for organizing resistance in response to their growing marginalization. On July 16, 1855 some ten thousand tribal, under the messianic leadership of four Santal brothers stood their ground firmly and fought with bows and a kind of battle-axe in a battle near *Pirpaiti* (Dutta, 1940:26). Although, the revolt collapsed eventually after half their members were reportedly killed, its effects were far-reaching. The Hul Rebellion (as it is known among the Santal) profoundly influenced the ideological development of many Santal communities (Duyker, 1987:35), and lives on in the songs and oral traditions of the tribal people of this area. *Second*, West Bengal acts as the key precursor to JFM in India. India's JFM programme, implemented through a June 1990 Ministry of Environment and Forests (MoEF), Government of India Circular, is to a large extent based upon the successful experience of joint management of forest in Arabari in Midnapore district of West Bengal, which have demonstrated beyond doubt that local communities can protect forest patches near their villages and that the forest department too can work with the people if it wants (World Bank, 2000:18; Mitra, 1997:42). The key precursor to JFM, from a managerial perspective, was a local-level initiative, dating from the early 1970s, in the Arabari (cited in Sarker and Das, 2006a:272). In Arabari, a forest officer (*A.K.Banerjee*) worked outside the official rules in an attempt to protect experimental plantations of reforestation. He discovered that by offering to share the benefits of the regrowth of trees, his own interests in protection could be met (Jeffery and Sundar, 1999:28; Sivaramakrishnan, 1999:90). In West Bengal, the JFM movement gathered momentum

when in 1989 a programme of resuscitation and reestablishment of *moribund sal* and other hardwood forests in the districts of Midnapore, Bankura, Purulia, Burdwan and Birbhum in south West Bengal was initiated by the government with the active participation and involvement of the local people. The *forest report* of West Bengal reveals that the overexploitation of trees for timber was so severe that thousand and thousand hectares of forest lands in the south West Bengal except *Sundarban* were almost treated as bare plain land, when the JFM was established; but such lands are almost secured after JFM programme (SFR, 2000:47). Government revenue from the degraded forest was almost nil when the JFM was established, but it has significantly increased after JFM (Das and Sarker, 2008:91). *Third*, in India, West Bengal is the first state which establishes new management system of separate gender planning on JFM, exclusively for women in Bankura district, the area of our study, as an experimental basis, understanding that women are being deprived of equal constitutional rights to benefits accruing from the forest in the joint forest protection committee (FPC). It seems to be relevant to mention that Government of West Bengal (GoWB) Order (dated July 12, 1989) does not make explicit mention of women as an independent entity; the membership is either joint or male/female. Beyond this, the Order is silent on women's separate role and involvement in committee formation, micro-planning, site selection, protection, benefit sharing etc. (Sarker and Das, 2002:4410-4411). Thus, understanding that women are being deprived of their equal constitutional rights to benefits accruing from the forest, efforts have been made very recently (from the early 1990s) by the Forest Department, GoWB to establish new management system of 'women forest committee' (i.e. female-headed forest protection committee[1]) in West Bengal. To this end seventeen *female* forest protection committees has been established primarily only in Bankura district in West Bengal. It has been extended to all the three forest divisions of the district (ibid: 44112). Although compared with general joint FPCs (almost male-headed FPCs) the number of female FPCs (female-headed FPCs) is insignificant, the movement has been started by the government effort, primarily, from Bankura district. This study also tries to explore whether the JFM households under female FPCs could reduce more inequality of income than joint FPCs within JFM villages.

III. Empirical Strategy

In order to study the stated objective, in addition to percentage changes, simple proportion, descriptive statistics and simple tabular analysis, the following methods are also employed:

Decomposition of income inequality

Measurement of poverty rate

Measurement poverty gap

IV. Data Set

The data have been collected through an intensive field enquiry covering all members from forest protection committee (FPC) villages under JFM programme (study group villages) and non-JFM villages (control group villages) – three sample female FPCs (core group), three joint FPCs (first control group) and two non-JFM villages (second control group). For the selection of female FPCs, random sampling technique (SRSWOR) is used (Das, 2008; Das and Sarker, 2008; Sarker and Das, 2008, 2007, 2006b). It is important to mention that each FPC under this study was formed in the respective village; so FPC/village is synonymous in this study. The field survey is conducted during the year 2005-06. In addition to the comparison on current data of after situation of JFM programme, data during before situation of JFM are also collected from all the households through the *reflexive comparison method* where 'after' and 'before' scenarios are compared for the participating households (Ravallion, 2001; Reddy et al., 2004; Reddy, and Soussan, 2004). A single 'before situation' is selected by the simple arithmetic mean of FPCs under study.

V. Results

At the very outset, we examine some characteristics of villages under study. More than 80 percent members of almost all JFM villages (both female and joint FPC-villages) and non-JFM villages are either schedule caste (SC) or schedule tribe (ST); more that 75 per cent households in each sample FPC village live below poverty line[2]; major part of income for all categories of households in all FPC/JFM villages and non-JFM villages is yielded from forest source during both before and after situations of JFM. All these might

lead to low economic and social status of forest fringe communities in rural Indian society.

Table 1 presents per capita annual net real income (in Rs.)[3] of various categories of households from forest source, non-forest source along with the change of income between two time periods (before and after situations of JFM). A common feature that emerges from Table 1 is that annual per capita net real income from forest source accounts for major share of per capita annual net real income for all categories of households under both JFM and non-JFM villages during both the situations. It also shows that per capita annual net real income for all categories of households has increased during after JFM situation compared with before JFM situation under both JFM and non-JFM villages. But such an increase is more pronounced for all categories of households under JFM villages. Categorically, the increase of forest income is higher for landless and marginal landholding households under JFM villages (ranging between 13.64 and 57.65 percentage points) as compared with same categories of households under non-JFM villages (6.68 and 17.42 percentage points respectively) and small landholding households under both JFM and non-JFM villages (ranging between 0.16 and 3.02 percentage points). The higher increase in income for landless and marginal categories of households under JFM villages has been made possible only due to substantial increase in income from forest source after JFM (Table 1 column 15). It seems to be relevant to mention that during before JFM situation the share of per capita annual net real income from forest source out of per capita annual net real income from all sources for all households under our study (combining both JFM and non-JFM villages together) ranges between 60.29 and 70.58 percentage points indicating that forest was major source of income for all categories of households before JFM. After JFM, the share of per capita annual net real income from forest source for the households under JFM villages, combining both female and joint FPC-villages together,, works out between 67.96 and 87.45 percentage points, and for non-JFM villages it is between 55.26 and 64.53 percentage points. These facts might suggest that the dependence on forest income for almost all households under JFM villages, irrespective of female and joint FPC-villages, has considerably increased after JFM programme; but the incidence of the

dependence on forest income is much lower for the households belonging to the better economic position on land-based economic status during both after and before situations The empirical evidence also suggests that forest is an important source of income for the poor forest fringe households who extract forest products (wood and non-wood forest products) for their subsistence and income with their active involvement in the sustainable community-based forest management programme (Fisher, 2004; Pattanayak et al., 2004; Kumar, 2002; World Bank, 2001; Somanathan, 1991).

Table 1 also shows that the variation of income (measured by coefficient of variation) among different categories of households is more pronounced for non-forest source of income than forest source. Among the forest source of income, variation of income is lower for households belonging to landless and marginal categories of households for both JFM and non-JFM villages. It seems to suggest that increase in forest income may reduce income inequality among households belonging to lower economic status under this study.

Concerning to the break-up of the share of per capita annual net real income derived from different sources of forest and non-forest sectors for forest fringe households during after and before situations of JFM is concerned, Table 2 shows that annual per capita net real income from forest source (combining all forest sources – NTFPs, forestry wage and timber forest products – together) accounts for major share of their per capita annual net real income for almost all categories of households under both JFM and non-JFM villages during both the situations. But after JFM situation, income from almost all non-forest subsources – farm, non-forest wage and 'others' – have decreased for all categories of households except small categories in the JFM villages. Conversely, there is a significant increase in forest income for all categories of households in the JFM households after JFM. Sector-wise, income from NTFPs' sale and forestry wage labour has much higher increase for JFM households after JFM when compared them with before JFM situation, the highest contribution being the NTFPs source. NTFPs alone constitutes 49 per cent of total income for landless and marginal categories of households and 44 per cent of total income for small category of households participating in the JFM programme and for all the categories this constitutes the major part among all sub-

sources (NTFPs, forestry wage, TFPs, farm, non-forest wage and others) of income during after situation of JFM programme. But their income from timber decreases after JFM as legal income (share from government timber revenue) and illegal income[4] from timber decreases (this decrease is more prominent for female FPC-villages) during after JFM. These seems to appear some achievements of JFM programme in West Bengal because the 1998 forest policy of the Government of India recognized the need to fulfill the requirements of fuel wood, fodder, minor forest produce and small timber of rural and tribal people, and emphasizes the need create a massive people's movements for protection and development of forests under community forest management programme.

Turning to non-JFM villages, Table 2 also shows that the non-timber income of non-JFM household's increases by around 2 percent on an average after JFM situation. For landless households it increases around 8 per cent during after JFM situation; but the share of NTFPs' income of the same categories of households works out about 14 and 13 percentage points during before and after JFM situations respectively. For marginal and small category of households the share of NTFP's income lies between 14 and 20 percentage points during after and before situations. This study, however, implies that, unlike JFM households, a small part of forest income for non-JFM households comes from NTFP's source after JFM situation. On the contrary, their major share of forest income is yielded from illegal income of timber during both before JFM and after JFM situations. Illegal timber income also constitutes the major part among all sub-sources (NTFPs, forestry wage, TFPs, farm, non-forest wage and others) of income during both the situations. It seems to suggest that the non-JFM poor households have to depend more on illegal forest income for their subsistence and income even after JFM situation owing to their non-involvement in the JFM programme.

Now the question arises as to whether JFM households belonging to lower economic status could improve the pattern of distribution of income after JFM situation. In this perspective, we examine the distribution of households by annual per capita net real income (in percentage) in Table 3. It shows that annual per capita net real income for all households under landless category and about 97 percent of marginal landholding households in JFM households live below poverty line during after situation of JFM

programme despite the fact that all households for both the categories also lived below poverty line during before situation of JFM programme. But there is a significant increase of income for over 65 percent (80.23 per cent in female FPC-villages and 54.91 per cent in joint FPC-villages) of landless households from 'below Rs. 2400' (or below Rs. 1260 during before situation of JFM) level to 'Rs. 2401 – Rs. 4728' (or Rs.1261- Rs. 2484 during before situation of JFM) level during after situation of JFM, whereas for marginal landholding households such an increase works out to about 31 percent cases (33.60 percent in female FPC-village and 29.49 per cent in joint FPC-village) after JFM. But, there is no such perceptible increase in income for the same categories of households under non-JFM villages during the same period; only 14.04 percent of landless and 17.94 percent of marginal categories households could bring about an increase in income from 'below Rs. 2400' level to 'Rs. 2401 – Rs. 4728' level after JFM situation compared with before JFM. Turning to small landholding households for JFM and non-JFM villages, annual per capita net real income of all small landholding households is found to exist in the above poverty line income in both the periods (before and after situations of JFM programme) with no perceptible change of this category from 'Rs. 4729 – Rs. 7200' to 'above Rs. 7200' during after JFM except households under female FPC-villages. Similarly, no perceptible change in income level above BPL category is observed to exist between female and joint FPCs within JFM villages except small category households in female FPCs. These facts might suggest that although there exists inequality in the distribution of annual per capita net real income among different categories of households under our study, the JFM programme seems to improve the income distribution pattern of the JFM households within below poverty line during after JFM situation – an upward mobility from lower income range to immediate higher income range within BPL range limit. However, this improvement within BPL category households is more pronounced in female FPCs compared with joint FPCs after JFM.

We now examine the decomposition of income inequality by various income sources and try to find out whether forest source of income plays the most important role in reducing income inequality among JFM households in general and households belonging to lower economic status in JFM villages in particular after JFM situation. Following Fisher

(2004), and Jaganathan and Pramodkumar (2003) the decomposition of income inequality by income source and that of by land-based economic status of the households under our study are presented in Tables 4 and 5 respectively. As may be seen from Table 4, for each of the source, income Gini coefficients (G_i) is higher than the aggregate income Gini (G) during both after and before situations of JFM for both JFM and non-JFM villages, indicating that diversification of income reduces income inequality across the study area. The share of total income inequality attributed to each income source (d_i) shows that NTFPs contribute to the highest share to total income inequality for JFM villages during after situation of JFM, followed by forestry wage and TFPs, largely because income from forest source accounts for the greater share of aggregate income (marked by w_i, in Table 4). But during before situation of JFM the contribution of the break-up of forest income has showed the highest for TFPs, followed by NTFPs and non-forest wage respectively for same villages. To assess whether a given source of income reduces or increases income inequality, we use the relative marginal effect (RME) which is defined as the difference between proportional contribution of a source to inequality and its share in total income (Jaganathan and Pramodkumar, 2003:511). As the direction and magnitude of RME gives the effect of change in income source to total inequality on the margin, the negative sign of the sources of forest income, namely NTFPs and forestry wage, during after JFM situation for FPC-villages indicates a decrease in total inequality due to an increase in income form those sources. For non-JFM villages during after JFM situation, and both JFM and non-JFM villages during before JFM situation, however, the RME is positive in each of the income sources (except 'others' under non-forest sector), although RME's magnitude in some cases is lower for forest sources than non-forest sources. It might indicate that there is a narrower scope to expand inequality with the increase in forest sources of income to total income relative to non-forest income irrespective of the type of villages – JFM and non-JFM – and types of FPCs – female FPC and joint FPC. Moreover, due to JFM programme for households under JFM villages, irrespective of female and joint FPCs, there is an improvement in the distributional equity owing to substantial increase in income from forest source. Gini coefficient of forest income is always lower than non-forest income in all types of villages during both before and after JFM situations under our study. It suggests that forest source of income lowers income

inequality in all types of villages under our study. This is in conformity with a number of studies (Fisher, 2004; Cavendish, 1999; Reddy and Chakravarty, 1999). Figure 1*a* presents the impact of forest income on income inequality for study group (after situation of JFM). Lorenz curves with the data for households' income including and excluding forest income show that addition of forest income to total income reduces the departure of the curve from the line of equal distribution (diagonal line) during after situation of JFM for JFM villages. If forest sources of income are excluded from the analysis, the estimated Gini coefficient increases from 0.47 to 0.59 which shows that addition of forest income reduces measured income inequality by about 12 per cent, all else equal. But no such perceptible decrease has been found during before situation for the same group (Figure 1*b*). As regards non-JFM households are concerned, although Gini coefficient of forest income reduces after JFM situation for non-JFM households, the addition of forest income to total income could not reduce their income inequality after JFM situation because the rate of increase of their forest income is lower than that of their non-forest income after JFM situation.

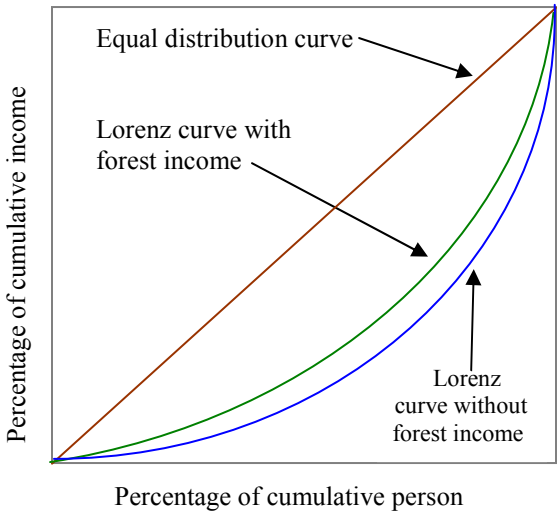

Figure 1a: *Impact of forest income on inequality of income for JFM villages during after JFM*

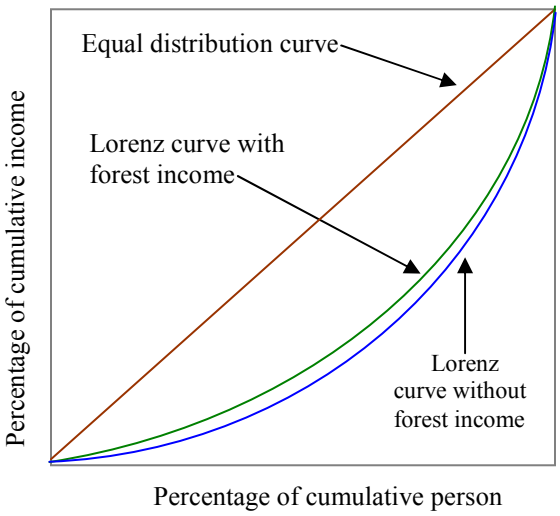

Figure 1b: *Impact of forest income on inequality of income for JFM villages during before JFM*

Table 5, representing decomposition of income inequality by land-based economic status, shows that source-wise (forest and non-forest sources) Gini coefficients are also higher

than aggregate income Gini for all categories of households – landless households, marginal landholding households and small landholding households – during both after and before situations of JFM for JFM- both female and joint FPCs – JFM villages. The break-up of forest sources (NTFPs, forestry wage labour and TFPs) and non-forest sources (farm, non-forest wage labour and others) also supports this phenomenon (Table 4). In keeping with results of Table 4, Table 5 also suggests that the addition of forest income to total income of household reduces measured income inequality within a range of 21 and 23 percentage points for landless and marginal categories of households respectively under JFM villages, irrespective of female and joint FPCs, due to JFM programme, whereas such an addition of forest income to total income brought about an insignificant reduction of income inequality for the same types of households before JFM. The lower values of poverty gap index (which measures the total shortfall of the poor from poverty line) for landless and marginal categories of households in particular under JFM villages after JFM might signify that forest income plays the dominant role in reducing measured income inequality, particularly for poor households who are relatively asset poor and that also live below poverty line, due to their involvement in JFM programme. This study also lends credence to the fact that as forest income plays the dominant role for the reduction of income inequality for households belonging to BPL category in the JFM villages, from economic point of view JFM programme has been more beneficial for members households belonging to BPL category in all JFM villages in particular.

VI. Conclusion

A brief recapitulation relating to all our discussions and evidence amounts to this: ***Firstly***, a common feature is that the annual per capita net real income from forest source accounts for major share of per capita annual net real income for all categories of households under both JFM and non-JFM villages during both the situations. Categorically, the incidence of the dependence on forest income is lower for the households belonging to the better economic position according to land-based economic status during both after and before situations. ***Secondly***, after JFM situation per capita net real income from forest source shows a major increase for all categories of households in

the JFM villages, irrespective of female and joint FPC villages, as compared with the same categories of households in the non-JFM villages. But the rate of increase of forest income is higher for landless and marginal landholding households under JFM villages than that of either among same categories of households under non-JFM villages or of among small categories of households in the JFM villages. ***Thirdly***, after JFM situation forest source of income increases for all JFM households with a decrease of non-forest source of income, whereas in the non-JFM villages non-forest income marks a higher rate of increase than their forest income. However, despite the decrease of non-forest income for JFM households after JFM situation, the influence of much higher increase of forest income brings about an increase of per capita net real income for JFM households compared with non-JFM households after JFM situation. But such an increase of net real income does not make any significant improvement of net real income for JFM households because the improvement is mainly restricted within BPL category of households – an upward mobility from lower income range to immediate higher income range within BPL range limit. It seems to suggest that the forest income is not the only means to bring about a significant improvement of net real income for JFM households, the means to increase non-forest source of income are also necessary for this achievement. ***Fourthly***, Gini coefficient of forest income is always lower than non-forest income in all types of villages during both before and after JFM situations under our study. There is a narrower scope to expand inequality with the increase in forest sources of income to total income relative to non-forest income irrespective of the type of villages – JFM and non-JFM villages – and types of FPCs – female FPC and joint FPC. Notably, there is an improvement in the distributional equity owing to substantial increase in income from forest source for JFM households, irrespective of female and joint FPCs; addition of forest income reduces measured income inequality by about 12 per cent, all else equal. But no such perceptible decrease has been found after JFM situation for non-JFM households, because the rate of increase of their forest income is lower than that of their non-forest income after JFM situation. ***Finally***, the lower values of poverty gap index (which measures the total shortfall of the poor from poverty line) for households under JFM villages after JFM might signify that forest income plays the dominant role in reducing measured income inequality for poor households who are relatively asset poor

and that also live below poverty line. Such an improvement of income inequality and poverty gap for poor JFM households who live below poverty line may be mainly due to their involvement in JFM programme. This study, however, lends credence to the fact that as forest income plays the dominant role for the reduction of income inequality for households belonging to BPL category in the JFM villages, from economic point of view JFM programme has been more beneficial for households belonging to BPL category in all JFM villages in particular.

But at the same time this study also suggests that the non-involvement in the JFM programme by the non-JFM households might bring about a major environmental shirking, because illegal timber income constitutes the major part of all sources of income for non-JFM households even after JFM situation. Categorically, the non-JFM poor households have to depend more on illegal forest income for their subsistence and income even after JFM situation. This study might indirectly lead to the fact that law or force can not effectively control the illegal extraction of TFPs of the poor categories households, which live below poverty line, until and unless a considerable income from legal forest source meets up their bare minimum level of subsistence. So, the expansion of JFM programme is an urgent need for non-JFM households in the forest fringe area in rural India in order to reduce poverty and income inequality for forest dependent poor on the one hand and to protect major environmental shirking on the other. Along with this, the expansion of non-forest source of income through institutional and non-institutional sources is also necessary for the improvement of net per capita real income of poor forest dependent households.

Notes

1. Community-level JFM unit in West Bengal is named as Forest Protection Committee (FPC) which is constituted from local beneficiaries within the jurisdiction of concerned Panchayat Samity (middle tier of the three-tier *Panchayat Raj* system of Indian federation). The *divisional forest officer* in consultation with 'Bon-O-Bhumi Sanskar Sthaee Samity' of concerned Panchayat Samity approves the FPC (GoWB, 1994:11).

2. Poverty line income in rural West Bengal on the basis of PCME (per capita monthly expenditure) by NSS of 56th round (1999-00) is Rs. 350.17. Based on the CPIAL (Consumer Price Index of Agricultural Labour [General]) the poverty line income for the year 2005-06 is calculated as Rs. 394.00 approximately.

3. Real earning (in Rs.) is determined after deflating the money income by Consumer Price Index for Agricultural Labourer (General) on the one hand, on other the procedures of estimation of net money income and hence cost and revenue during both before and after JFM situations are evaluated directly from our earlier study (Sarker and Das, 2008). It is worthwhile to mention that total revenue and total cost of rural forest fringe households under our study are estimated on two sources – forest (NTFPs, forestry wage and TFPs) and non-forest (farm, non-forest wage and others).

4. Never did the respondents say that their source of income was illegal; rather, while examining the answers from the respondents regarding the break-up of their source of income, the distinction between legal and illegal source was clearly demarcated.

[*Details of methodology and dataset will add shortly in soft version*]

Dr. Nimai Das is Research Officer of Economics at the Centre for Studies in Social Sciences, Calcutta (CSSSC), R-1 Baishnabghata Patuli Township, Kolkata - 700094, India.

Dr. Debnarayan Sarker is Professor of Economics, Centre for Economic Studies, Department of Economics, Presidency College, 86/1 College Street, Kolkata - 700073, India.

[**Email**: **nimai_econ@rediffmail.com**, **sarkar_d_n@rediffmail.com**]